Mount Airy Sewer Service Area

Current Conditions

The Town of Mount Airy owns and operates the community sewer system, which is located in the southwest corner of the County. See Map 24: Mount Airy SSA. The Mount Airy SSA covers approximately 3,280 acres and serves 3,627 connections. See Map 24: Mount Airy SSA. Mount Airy WWTP design capacity is 1.2 MGD. Average flows are 0.732 MGD.
The plant discharges to the South Branch of the Patapsco River. The plant was upgraded to ENR in 2011.

The Mount Airy sewer system includes eleven pumping stations, interceptors and collection lines ranging from 6-inch to 15-inch diameter, and a WWTP. The WWTP is located one mile east of MD 27 and south of Watersville Road. The plant discharges treated wastewater into the South Branch of the Patapsco River, and has a design capacity of 1.2 MGD, with a two-year average flow from 2021-2022 of approximately 0.732 MGD, including a significant amount of I&I. The Town continues to work on lowering I&I issues. In 2021 the Town surveyed the wastewater collection system to identify key areas of rain and groundwater penetrating the collection system. In 2022 the Town had 3.5 miles of Cured-in-Place-Pipe (CIPP) liners installed to seal those I&I areas.

The WWTP treatment process consists of a Biological Nutrient Removal (BNR) Five-Stage Bardenpho Process and a Severn-Trent Denitrification Filtration System to Enhanced Nutrient Removal (ENR) requirements of 3.0 mg/l Total Nitrogen and 0.3mg/l Total Phosphorus.

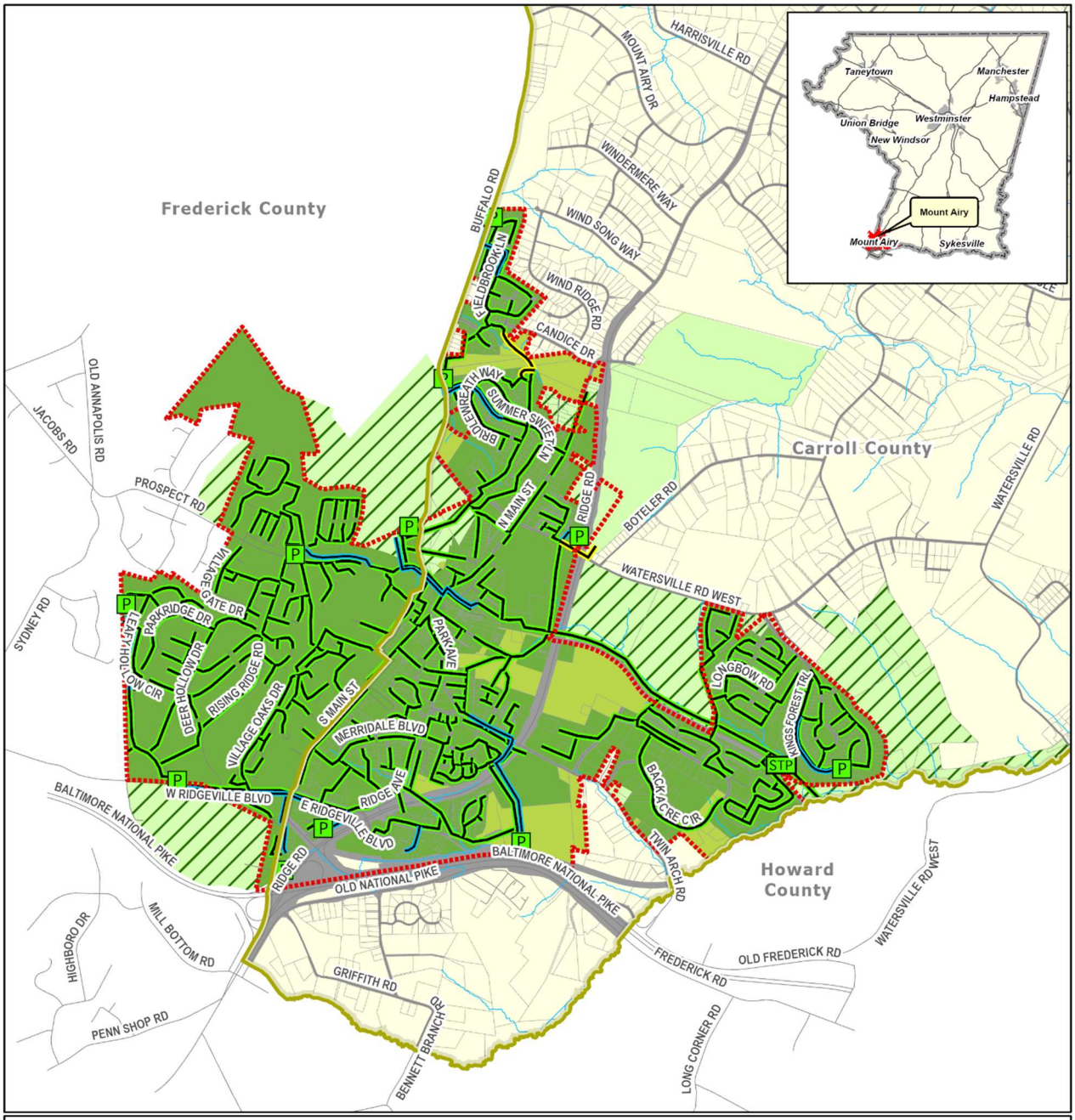
A capacity expansion evaluation was completed for the Mount Airy WWTP in September 2022 which provides alternative processes including:

1) Implementing a BioMag™ System, which is a ballasted activated sludge system that allows the MLSS to be increased substantially;
2) Implementing a membrane bioreactor (MBR) process that utilizes membranes for solids liquids separation (in lieu of clarifiers), which allows the MLSS to be increased substantially;
3) Implementing the integrated fixed film activated sludge (IFAS) process, which provides media within the reactors to increase the biomass available for treatment.

These three processes/systems listed above are considered “process intensifying” technologies as they allow increased treatment performance within a given reactor volume. Alternatives that required the addition of reactors and clarifiers were not evaluated as there is insufficient footprint available on the existing site.

The evaluation included both a 25% increase and 50% increase in capacity, to 1.5 MGD and 1.8 MGD respectively. It was found that only the MBR or IFAS systems could expand the plant capacity to 1.8 MGD whereas BioMag™ was limited to 1.5 MGD. The study also concluded that expanding to 1.8 MGD has a much greater cost effectiveness than the 1.5 MGD and is estimated between $14M and $15M total capital cost and $13M -$15M 20-year NPV (Net Present Value) O & M cost.

Map 24



Mount Airy Sewer Service Area
Carroll County, Maryland

Water & Sewer Master Plan
Triennial Update 2023
DRAFT

Sewer Service Categories
- W - 1 Existing/Final Planning
- W - 3 Priority (0-6 yr)
- W - 6 Future (7-10 yr)
- W - 7 Long Range (10+ yr)

Sewer Distribution Lines
- Existing Line
- Existing Force Main
- Priority Line

Sewer Facilities
- STP Existing Treatment Plant
- P Existing Pumping Station

General
- County Border
- Corporate Limit

0 1,250 2,500 Ft.

N

Prepared by the Carroll County Department Planning, 05/2023 (kc) This data is prepared by Carroll County for internal use and is made available because it is public information. Carroll County, its agencies or employees, do not warrant its accuracy or suitability for any purpose. The reader should contact appropriate regulating agencies to determine accuracy or suitability of the data for a particular use. *The location of all priority or future facilities and distribution lines are for planning purposes only.

Inventory of Existing Wastewater Treatment Plants, Interceptors, Sewage Pumping Stations, and Force Mains

See Tables 20A-20D for Mount Airy SSA Infrastructure.

Table 20A: Mount Airy SSA Wastewater Treatment Plant

WWTP Treatment Type	Points of Discharge	WWTP Design Capacity (MGD)	Average Flows (MGD)	Method of Sludge Disposal
ENR	South Branch Patapsco River	1.200	0.725	Lime stabilized sludge is hauled to be land applied on farms and/or disposed of at Carroll County Landfill.
Mount Airy WWTP Discharge Permit Number: 00DP0641A **NPDES Number**: MD0022527A				
Town of Mount Airy Water System Discharge Permit Number: 00HT9535 **NPDES Number**: MDG679535				

Table 20B: Mount Airy SSA Interceptors

Interceptor	Diameter (inches)	Average Day Flow (MGD)	Design Flow (MGD)
Station 1 (2 interceptors)	8	0.375	0.936
Station 2	8	0.005	0.259
Station 3	8	0.055	0.720
Station 4 (3 interceptors)	8	0.175	0.576
Station 5 (3 interceptors)	10 (1) 8 (2)	0.350	0.936
Station 6	6	0.015	0.252
Station 8	8	0.030	0.288
Station 9	8	0.080	0.288
Station 10	8	0.025	0.374
Station 7	8	0.030	0.216
Wastewater Treatment Plant	15	0.722	1.200
Total		***1.862***	***6.045***

Table 20C: Mount Airy SSA Pumping Stations

Pumping Station	Coordinate Location*	# of Pumps	Capacity of Each Pump (MGD)	Normal Pumping Capacity (MGD)	Average Day Pumping (MGD)
Station 1	N 617782.66 E 1270540.77	4	0.936	n/a	0.300
Station 2	N 617320.16 E 1265265.77	2	0.259	n/a	0.002
Station 3	N 619051.41 E 1262790.77	2	0.720.	n/a	0.056
Station 4	N 624213.91 E 1265703.27	4	0.576	n/a	0.157
Station 5	N 624488.91 E 1267753.27	2	0.936	n/a	0.250
Station 6	N 624632.66 E 1271809.52	2	0.252	n/a	0.008
Station 7	N 617782.66 E 1266084.52	2	0.216	n/a	0.014
Station 8	N 622676.41 E 1261740.77	2	0.288	n/a	0.021
Station 9	N 627882.66 E 1268847.02	2	0.288	n/a	0.013
Station 10	N619113.35 E1277753.81	1	0.374	n/a	0.001
Station 11	N631608.62	1	0.173	n/a	n/a

Table 20C: Mount Airy SSA Pumping Stations

Pumping Station	Coordinate Location*	# of Pumps	Capacity of Each Pump (MGD)	Normal Pumping Capacity (MGD)	Average Day Pumping (MGD)
	E1269968.0				
Total		*24*	*3.103*	*n/a*	*0.822*

*Coordinate locations are Maryland State Plane 1983 Datum.

Table 20D: Mount Airy SSA Force Mains

Force Main	Maximum Day Pumpage in MGD (date)	Diameter (inches)	Design Flow (MGD)
Station 1	0.601	10	0.936
Station 2	0.003	6	0.259
Station 3	0.069	8	0.720
Station 4	0.245	6	0.576
Station 5	0.534	10	0.936
Station 6	0.012	6	0.252
Station 7	0.023	6	0.216
Station 8	0.028	8	0.288
Station 9	0.020	8	0.288
Station 10	0.002	6	0.374
Station 11	0.	4	0.173
Total	*1.537*		*4.845*

*Provided Design Average Daily Flow for Design Flow.

Sludge Management

The Mount Airy Sewage Treatment Plant produces over 1,300 wet tons of sludge per year. The sludge is held in a 300,000- gallon aerobic digester. The sludge is then pumped to a belt-filter press. The sludge is then dewatered, and lime stabilized.

The Town has a contract to land apply the lime stabilization sludge. The Town also has permits to dispose of sludge at the Carroll County landfill during times that it cannot be land applied. See Table 20E for the Mount Airy SSA Sludge Management.

Table 20E: Mount Airy SSA Sludge Management

Quantity	Quality	Method of Disposal/Use	Permit #s	Future Disposal Method	Problems
1319 wet tons/ 272 dry tons	Lime Stabilization	Agricultural land use, landfill application	S-03-06-4513-L S-03-10-4982-L S-01-06-4789-A	Same	None

Allocation Procedure

Each building permit is reviewed for allocation needs and for conformance with the Town's Adequate Public Facilities Ordinance.

Needs Analysis

Mount Airy's Inflow & Infiltration was greatly reduced in 2022 and the Town will continue to monitor and make improvements to reduce the I&I and will continue to address this problem in upcoming years. Monitoring and correction of these problems will help to prevent unnecessary flows to the wastewater treatment plant and allow capacity to be used elsewhere in the service area.

The large tract of land known as the Harrison-Leishear property may have significant development potential in the near future. This area currently is not improved with any public sewer infrastructure, which would need to be in place for the property to realize its full development potential.

The total future wastewater demand assumes that everything within the GAB build out according to the adopted land use plan. The total future wastewater demand for the Mount Airy WWTP, depending on proposed development uses and quantities, will more than likely exceed the existing Wastewater Treatment Plant capacity and 15-inch gravity sewer main.

Site constraints at the WWTP include a stream, floodplain, forest conservation, and a stormwater management facility which will limit expansion of the existing Bardenpho process. However, two alternative processes, MBR or IFAS, could expand the plant to 1.8 MGD design capacity utilizing the same footprint. The Mount Airy WWTP discharges approximately 3 river miles upstream of a Tier II segment of the South Branch of the Patapsco River. Given the high levels of treatment and large distance to the segment, the Tier II designation is not expected to represent a controlling limitation on the Mount Airy WWTP discharge.

The Mount Airy WWTP NPDES permit includes standard limits for secondary treatment facilities and is fully protective of receiving waters. Limits for parameters, such as ammonia, were derived for local water quality protection and are expected to remain achievable even under higher effluent flows. Discharge temperatures are being monitored for compliance.

Planned Projects and Recommendations

See Table 20F for Mount Airy SSA priority projects.

Table 20F: Mount Airy SSA Priority Projects

Project Name	Planning Category	Description	Location	Capacity Added
Infiltration/Inflow Reduction	Priority (S-3) Immediate	Monitor and make improvements	Entire System	0 MGD
Discharge Temp Reduction	Priority (S-3) 10 years	NPDES Permit Requirement	Mount Airy WWTP	0 MGD